
**22nd International Symposium on
Methodologies for Intelligent Systems**

**October 21-23, 2015
Lyon, France**
<http://liris.cnrs.fr/ismis15/>

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Welcome to ISMIS 2015

On behalf of the conference committee for ISMIS 2015, it is our pleasure to welcome you to Lyon, France for the 22nd International Symposium on Methodologies for Intelligent Systems.

ISMIS is an established and prestigious conference for exchanging the latest research results in building intelligent systems. Held twice every three years, the conference provides a medium for exchanging scientific research and technological achievements accomplished by the international community.

This is the second time ISMIS is hosted in Lyon, France. The first time was ISMIS 2002. Lyon, listed as a UNESCO World Heritage Site, with two rivers flowing through it, is a city of light, and most importantly a city with an original way of life. The richness of its history, its culinary heritage, the splendor of its cultural life, and its position at the heart of one of the most attractive regions in France, make it one of the major European tourist destinations.

The success of the conference depended on the help of many people, and our thanks go to all of them: the chairs and members of the ISMIS 2015 committee for their hard work and precious time to make this a success, the invited speakers and the organizers.

Welcome and enjoy ISMIS 2015, Lyon and France.

Symposium Chairs

- Mohand-Saïd Hacid
- Zbigniew W. Ras

Program Co-Chairs

- Floriana Esposito
- Olivier Pivert

Organization Chair

- Emmanuel Coquery

Proceedings Chair

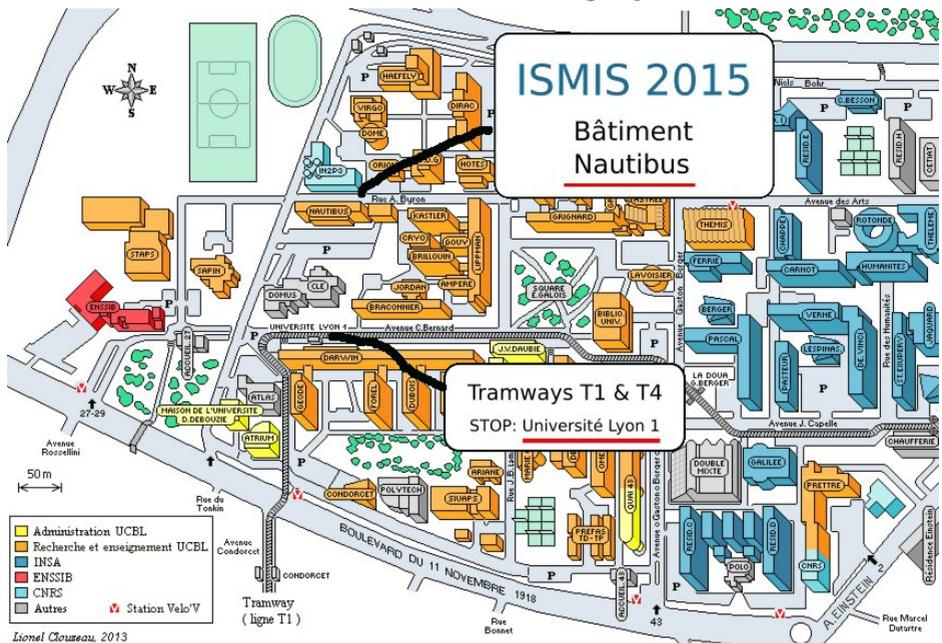
- Stefano Ferilli

Conference Venue

The conference will take place at the Campus Universitaire de la Doua, Université Lyon 1, Nautibus, Lyon , France.

Local map

The exact location of the conference is shown in the following map:



Accessing the DOUA Campus

By tramway: The Campus is served by “Tramways T1 and T4”, which connects with subway lines A and B at stop Charpennes Charles Hernu and Line B at stop Lyon Part Dieu. You can take a look at the Lyon transportation map.

From Part Dieu Station: take the “Tramways T1 or T4” and get off the Tramway at stop “Université Lyon 1”.

From Charpennes Charles Hernu Station: take the “Tramways T1 or T4” and get off the Tramway at stop “Université Lyon 1”.

Please note that a Tramway ticket (1.70 €) is valid one (1) hour from the first use. You can combine bus, subway and tramway with the same ticket (within a limit of one (1) hour).

Coming to Lyon

By TGV (high speed train): The Campus is 20 minutes from Part-Dieu TGV station and 30 minutes from Perrache station. TGV trains run between Lyon and Paris every hour or every half an hour. Lyon - Paris : 1h55, Lyon - Marseille : 1h35, Lyon - Genève : 1h50, Lyon - Bruxelles : 3h50. Online ticket booking is possible on the SNCF website.

By road: Right at the city centre's north-east entrance, next to the motorway network and northern orbital road, Porte de Saint Clair exit, direction Cité internationale. By way of example, Lyon is 1h30 from Geneva, 3h from Turin, 4h from Paris, 4h30 from Milan, 5h from Barcelona... The GPS reference is: 45°47.0829', 4°51.1488'. GPS address is "50, quai Charles de Gaulle, 69006 Lyon".

By air: Lyon-Saint Exupéry is the French airport with the largest number of routes outside Paris, with 27 French towns and cities connected by daily scheduled flights, 43 scheduled international routes, 19 charter routes and 7 cargo routes (winter programme). Part Dieu TGV Station is 30 minutes from the airport Lyon-Saint Exupéry multimodal station. From Lyon Saint-Exupery Airport, take the tramway RhôneExpress (<http://www.rhonexpress.fr/>) for Part-Dieu TGV station which runs every 20 min.

General Informations

Lunches and Coffee Break Coffee breaks will be available at the back of room C4 or C5.

Lunches will be served at the DOMUS building (between the tram stop and the Nautibus building).

Internet Access Complimentary wireless internet access is available for the duration of the conference at the conference venue.

No Smoking Policy Delegates should be aware that smoking is banned from all public buildings in France, including in the Nautibus building

Money France's unit of currency is the Euro. Coins have values of 1, 2, 5, 10, 20, and 50 cents, €1 and €2. Notes have a value of €5, €10, €20, €50, €100, €200 and €500. Foreign currency can easily be exchanged at banks and bureau-de-change booths. Major credit cards are accepted throughout France, with travellers cheques accepted in hotels, banks and some stores. Tax is included in prices (5.5% or 19.6% according products).

For the latest exchange rate please visit: <https://www.banque-france.fr/en/economics-statistics-rates/exchange-rates.html>

Electricity Electricity is supplied throughout the country at 230 volts, 50 hertz. For equipment from countries that use 110 volts, an adapter/converter will be necessary unless your equipment is able to run on both 110 and 230/240 volts.

Tipping Tipping is not obligatory in France, even in restaurants or bars - but it's not frowned upon either. Tipping is left entirely to your discretion, and may be appropriate if you receive excellent service.

Banking Banks are generally open Monday to Friday between 9am-5pm, and Saturday morning: Banque Populaire, BNP Paribas, Crédit Agricole, Caisse d'Epargne, CIC Lyonnaise de Banque, Crédit Mutuel, HSBC, LCL-Le Crédit Lyonnais, Société Générale, ...

Sending a Postcard From the moment you send your mail, La Poste makes sure it's in safe hands every step of the way. Stamps are sold in post offices where the postrate to your destination will be indicated. You can post your letter in one of the street letterboxes (yellow). You may also post it in a post office.

Gala Dinner



The gala dinner will be held in Beaujolais, in the Château d'Envaux, a lord dwelling place from the 16th century. The place is also a wine domain since and now produce a Julié纳斯 wine with character.

A Brief History Of Lyon

Lyon, listed as a UNESCO World Heritage Site, a city with two rivers flowing through it, a city of light, and most importantly a city with an original way of life; the richness of its heritage, the splendor of its cultural life, and its position at the heart of one of the most attractive regions in France, make it one of the major European tourist destinations.

The history of Lyon, known at the time as Lugdunum (meaning “the hill of light” or “the hill of crows”) began under the Romans, in the first century B.C. when the city was proclaimed capital of the three Gauls. This official status brought political, economic, military and religious development to the city. This period of pre-eminence lasted 3 centuries but did not survive the downfall of the Roman Empire. A long period of upheaval possessed the city until the church gave it new impetus by declaring Lyon the seat of the Primate of Gaul in the 11th century.

From that time, prosperity continued to grow, reaching its peak in the Renaissance. By the end of the 15th century, Lyon was an important center of trade with its fairs and a well-developed banking system which attracted commercial interests from all over Europe. Soon, the social, intellectual and artistic elite settled here. Development continued through the 17th and 18th centuries with the Lyon silk industry supplying the world’s wealthy with clothing and interior decoration. The city continued to gain in size and equipped itself with hospitals, public squares and impressive edifices.

The French Revolution in 1789 brought a brutal halt to expansion but development was revitalized under the Napoleonic empire. Lyon became an industrial city and pursued its urban development with a distinct preference for the Haussman style prevalent at the time. Though the revolt of the Canuts silk workers tarnished the era, Lyon enjoyed an undeniable power which it carried into the 20th century.

Urban development continued to expand and change the face of the city. During World War II, Lyon was the center of the French Resistance. The post-war period marked the beginning of the race for modernity with a new challenge, the construction of Europe. Lyon acquired a European dimension through the development of the transportation system, hotel and other tourist facilities, cultural establishments and the creation of the Part-Dieu business quarter in 1960.

The 1980’s saw a new drive to improve the city’s infrastructure. The momentum continues today. Important town planning projects have been completed in strategic locations, while maintaining a policy of preservation of local historical cultural assets. In barely a dozen years, Lyon has become a major metropolis where the successes of the past live in harmony with the goals of the future. These different phases of Lyon’s history are engraved in the urban landscape.

Gallo-Roman Lyon: the rise and fall of the Gallic capital. Though the first traces of human presence date back to the iron age, the founding of Lyon was given by Roman legate on October 9th, in the year 43 B.C. In keeping with imperial design, the city quickly assumed the position of political, economic, military and religious capital of the three Gauls.

At the meeting point of the Saône and Rhone rivers, Lugdunum, as Lyon was then known, developed first on Fourvière Hill, where a forum, theater, temple of Cybele, Odeum and public baths were erected. Its territory extended to Croix-Rousse Hill (amphitheater) and down to the Presqu’île, home to residential buildings, shops and workshops. The city was located at the intersection of great Roman roads and its water supply arrived via four aqueducts, ruins of which can still be seen in the region. As the birthplace of Christianity in Gaul, Lyon witnessed its first martyrs in the year 177 with the torture of Saint Blandine. The persecutions of 177 marked the start of Lugdunum’s decline. The Capital of the Gauls was a city of the arts. The ceramicists, bronze makers, and glass makers of Lyon were renowned throughout the empire.

20 years later the city was ravaged by fire, in punishment for its ill-chosen alliance in a power struggle between two Roman generals. At the end of the 3rd century, the decline of the Roman Empire exposed Lugdunum to the violent invasions of the Barbarians who chased out the inhabitants of the upper city.

Medieval Lyon, or the ecclesiastic city. Not until the 9th century, with the rise of the church, did the city flourish once again. The name Lugdunum underwent changes with the passing of the centuries and came to be known as Lyon. In the year 1079, with its new-found status as seat of the Primate of Gaul, power and authority returned to the city. It endowed itself with bridges and religious edifices including the Carolingian Saint Martin d'Ainay Abbey and the gothic Saint Jean Cathedral.

Commerce sprang up again and with it came increasing prosperity for the ecclesiastic city. Trade contributed to the development of craft industries and diversified professional activities, including the food and textiles sectors. A revolt of the "Bourgeois" (merchants, bankers, craftsmen) earned them the right to self-administration but, above all, gave the town its official motto, "Onward, onward, Lyon the Best".

Lyon's Renaissance splendors. In the 15th and 16th centuries, the growth and prestige of Lyon were unrivaled. Trade was booming with two and later four annual free fairs. The arrival of large foreign banking houses made Lyon one of Europe's great trading and banking centers. The Renaissance era saw Lyon's influence spread across Europe.

The predominant features of the city's commerce began to emerge: silk and silk products, and the textile sector in general. Banking took on an important role thanks to the high level of trade. It was here that the first letter of credit was established. Broad-ranging commerce led to the multiplication of industrial activities. In addition to textiles came the development of metallurgy. The city's publishing activities placed it among the leaders of Europe. For the royal authorities in Paris, Lyon played the role of relay-city on the political and financial level, but also for military purposes, particularly during the wars with Italy. Its splendor shone far beyond French borders. Artistic and intellectual talents from all over Europe flocked to Lyon. The Lyon printing industry was the most important in France. Rabelais, before writing Gargantua and Pantagruel, was doctor at the Hôtel Dieu and the poetess Louise Labé, also known as "la belle Cordière", held her salon and was the epitome of the spirit of the times. This era also gave the city the most beautiful ensemble of Renaissance buildings in France: Vieux-Lyon and its architectural treasures (Hôtels Bullioud, d'Estaing, Paterin, Gadagne, Philibert Delorme Gallery, Tour Rose, Loge du Change, etc.) and unusual covered passageways called "traboules". In the 16th century, Francis I began encouraging the silk weaving industry in order to put a stop to uncontrollable imports. Hundreds of looms were churning between Saint Jean and Saint Georges and Lyon soon became the production capital for this precious fabric.

The 17th and 18th centuries in Lyon: a city of classicism. The face of Lyon had changed since the time of the Renaissance. The basis of its fortune and the composition of its activities were no longer the same. The heritage of the past was not lost, but the great trading and banking capital had become a manufacturing city, a city of silk makers and merchants and the popular mass of weavers. Lyon had become the second largest city in the kingdom after Paris. The center of influence of Lyon shifted to the peninsula and the city built some of its most prestigious monuments in this period: the new City Hall built by Simon Maupin, the convent-palace on Place des Terreaux, now the Museum of Fine Arts, the Hôpital de la Charité, later destroyed.

The silk industry brought to Lyon the highest concentration of workers in the entire country and, in the 18th century, the city was renowned throughout Europe. The century of the Enlightenment was an era of scientific breakthroughs and saw the establishment of the first veterinary school in Europe, the ascension of the first Montgolfier hot air balloon and the discoveries of the physicist Ampere. The urban landscape evolved: ports and bridges were constructed, new convents were built occupying large tracts of land, later to be recovered for development. Town planning became an important concern for organizing local development. The major works undertaken at the time coincided with the arrival in Lyon of the brilliant

architect Germain Soufflot, who greatly influenced the urban modernization of the city and who supported the young Michel-Antoine Perrache in his efforts to extend the city southwards by consolidating the islands in the confluence. Morand drained the swamps of the left bank of the Rhone and completed the construction of Place Bellecour. The French Revolution was a traumatic time for the city: In 1793, the Convention, judging the city too royalist, struck it from the map with this infamous line, "Lyon n'est plus" (Lyon is no more) and ordered the destruction of the buildings of Place Bellecour.

A 19th century industrial city. Lyon owes its worker tradition to the multitude of laborers, apprentices, weavers and dyers. In 1831 and 1834, the Canuts, as the silk workers were known, revolted against the refusal of manufacturers to agree to a minimum rate for custom work. These uprisings, born of harsh working conditions, should not make us forget the humor and liveliness of the Lyon people, as represented by the local puppet character, Guignol.

The decree of 24 March 1852 annexed to Lyon the three suburbs of La Guillotière, Vaise and Croix-Rousse, and was inspired by political concerns for maintaining public order. Lyon in the 1870s was no longer a mono-industry town. The integration of the suburbs brought in new industries: mechanical construction and chemicals.

Napoleon's reign proved to be very favorable to Lyon. Industrial prosperity, lead by the silk merchants, was on the upswing but technical progress, in particular Jacquard's mechanical loom allowing one man to do the work of six, had serious social repercussions. The silk industry made the Lyon area an economic powerhouse: mulberry plantations and silkworm farms and mills abounded in the Rhone valley. Lyon's silk industry became an essential element of the French economy.

New construction work continued to change the cityscape: the opera house, the court house, the stock exchange, the laying of two large boulevards (now named Rue de la République and Rue Edouard Herriot) lined by elegant Haussmanian façades, and the construction of the Tête d'Or Park. Urban development continued under the Third Republic: the universities, the Prefecture and the Fourvière Basilica were built at this time as was the Lumière family home, now the Lumiere Institute where, in 1895, one of the world's most important entertainment activities was invented: motion pictures. With its discrete prosperity, held by family-run businesses, Lyon moved calmly into the 20th century.

Contemporary Lyon: heading to the future. Urban development throughout the 20th century was influenced by the political figures managing the city. For nearly half a century, the destiny of the city was entrusted to Edouard Herriot. The role of the municipality was particularly noticeable in the area of primary and vocational education and hospital facilities.

From the early 1900s, new buildings were juxtaposed with the splendid heritage of the past as Lyon pursued its drive for modernity. The civil architect, Tony Garnier, designed housing, a stadium, a hospital, and a slaughterhouse. Industry (Berliet, Rhône Poulenc, Mérieux, etc.) continued to rise, shutting down only during World War II. Because it was in the free zone until 1942, Lyon emerged as the capital of the French Resistance forces, led by men such as Jean Moulin. Reconstruction brought the building of residential towers in new neighborhoods on the outskirts of Lyon.

The post-war years gave the city a European dimension with the development of transportation (Satolas Airport - now Saint-Exupéry -, freeways, the subway), municipal infrastructures (Convention Center, hospitals, a theater in the 8th district, the Municipal library, the Auditorium) and the creation in 1960 of the Part-Dieu business district.

In 1968, the 54 towns surrounding Lyon gathered forces in the form of Greater Lyon, making it the second most important metropolitan area in France. New momentum was given in 1980 with the first TGV train station in France and the construction of a vast exhibition hall (Eurexpo). The multi-modal hub at Lyon Saint-Exupéry airport further reinforced Lyon's opening to the world. Major urban development projects have been undertaken on strategic sites in the city (Cité Internationale, the Champ du Pont in Bron, Gerland). Cultural monuments such as the Opera House and the Museum of Fine Arts were completely renovated. The Museum of Contemporary Art acquired a greater dimension in its new home in the Cité Internationale.

The urban setting has also been greatly improved with a public lighting program enhancing city monuments and the renovation of public spaces and promenades. The sum of all these assets made Lyon a natural choice for the G7 summit of the world's 7 most industrialized nations in June 1996.

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Lyon Points Of Interest

Lyon Tourism

Post address:

Office du Tourisme & des Congrès du Grand Lyon
Place Bellecour - BP 2254
69214 Lyon cedex 02
(Subway line A/D “Bellecour”)

Opening hours: The Tourism Office is open 7/7, from 9 am to 6 pm.

Telephone: +33 (0)4 72 77 69 69

<http://www.en.lyon-france.com/>

<http://www.lyon.fr/vd1/sections/en/> (City of Lyon official web site)

Culture in Lyon

The City of Lyon has a multitude of facilities to guarantee an intense cultural life: some thirty museums house permanent collections and frequent temporary exhibitions, contributing to the cultural and artistic renown of the city; a network of 15 libraries continues to develop, thanks to the recent opening of a specialized media library of the theater arts.

The Dance Theater, attracting troupes and audiences from around the world, is a unique institution in France for the depth and range of dancing performances it offers, be they of French or foreign origin, classical or contemporary. The city is home to both an Opera Orchestra at the Opera House and a National Orchestra at the Auditorium, whose reputation goes far beyond national borders. The Subsistances complex is a center for artistic creation encouraging cross-disciplinary experimentation, with a focus on new configurations in the performing arts: dance, theater, modern circus.

Theaters

Théâtre des Célestins: <http://www.celestins-lyon.org>

Les Subsistances: <http://www.les-subs.com/>

Théâtre de la Croix-Rousse: <http://www.croix-rousse.com>

Théâtre du Point du jour: <http://www.lepointdujour.fr/>

New Generation Theatre: <http://www.tng-lyon.fr/>

Théâtre National Populaire: <http://www.tnp-villeurbanne.com>

Cinemas

UGC Ciné Cité Lyon Quai Charles de Gaulle 69006 Lyon

Institut-Lumière 25 rue du Premier-Film 69008 Lyon

Cinéma Comoedia 13 avenue Berthelot 69007 Lyon

UGC Lyon Part-Dieu 2-4 Centre commercial La Part-Dieu 69003 Lyon

Pathé Vaise 43 rue des docks 69009 Lyon

UGC Astoria 31 cours Vitton 69006 Lyon

Le Cinéma-Opéra 6 rue Joseph-Serlin 69001 Lyon

Le Cinéma 18 rue Saint-Polycarpe 69001 Lyon

Pathé Cordeliers 20 rue Thomassin 69002 Lyon

Pathé Bellecour 79 rue de la République 69002 Lyon

CNP Terreaux 40 rue du Président-Edouard-Herriot 69001 Lyon

La Fourmi 68 rue Pierre-Corneille 69003 Lyon
Ciné-Duchère avenue Andreï-Sakharov 69009 Lyon

Museums

Museums in Lyon Musée des Beaux-Arts de Lyon: <http://www.mba-lyon.fr>

Musée d'Art Contemporain: <http://www.moca-lyon.org>

Institut Lumière: <http://www.institut-lumiere.org>

Musée de l'Imprimerie: <http://www.imprimerie.lyon.fr>

Musée Gadagne: <http://www.museegadagne.com>

Musée gallo-romain de Lyon-Fourvière:

<http://www.musee-gallo-romain.com/fourviere>

Musée des Tissus et des Arts Décoratifs: <http://www.musee-des-tissus.com>

Museum d'Histoire Naturelle: <http://www.museum-lyon.org>

Institut d'Art Contemporain: <http://www.i-art-c.org>

Musée Africain de Lyon: <http://www.musee-africain-lyon.org>

Musée d'Art Sacré de Fourvière: <http://www.fourviere.org/>

Musée des Automates EMA: <http://www.automates-ema.com>

Musée des Hospices Civils de Lyon:

http://www.chu-lyon.fr/internet/chu/musee/presentation_musee.htm

Musée des sapeurs-pompiers du Grand Lyon: <http://www.musee-pompiers.asso.fr>

Musée international de la miniature: <http://www.mimlyon.com>

Musée Testut Latarjet d'Anatomie: <http://museet1.univ-lyon1.fr>

Centre d'Histoire de la Résistance et de la Déportation: <http://www.chrd.lyon.fr/>

Maison des Canuts: <http://www.maisondescanuts.com/>

Musée urbain Tony Garnier: <http://www.museeurbaintonygarnier.com/>

Museums around Lyon Musée de la poupée: <http://www.lacroix-laval.com/>

Musée gallo-romain de Saint-Romain-en-Gal / Vienne:

http://www.musee-gallo-romain.com/st_romain/accueil

Monastère royal de Brou

Historial du Saint Curée d'Ars: <http://www.musee-ars.org>

Musée Claude Bernard: <http://www.fond-merieux.org/musee/>

Musée du Chapeau: <http://www.museeduchapeau.com>

Musée du Vieux Saint-Etienne: <http://www.vieux-saint-etienne.com>

Musée Théâtre Guignol des Vallons du Lyonnais: <http://www.museetheatreguignol.fr>

Art galleries

Galerie du Vieux Lyon: <http://www.galerie-vieuxlyon.com>

Galerie José Martinez

Galerie Laurencin: <http://www.laurencin.net>

Galerie Olivier Houg: <http://www.olivierhoug.com>

La Galerie des Ombres: <http://www.epernet.fr/galeriedesombres>

Le Soleil sur la Place: <http://www.lesoleilsurlaplace.com>

Galerie L'Ebauchoir: <http://www.ebauchoir.com>

Archaia: <http://www.archaia.fr>

Artaé: <http://www.artae.fr>

Chantal et Patrick Pons: <http://www.tableaux-pons.com>

DELOHA galerie: <http://site.voila.fr/deloha-galerie>

Galerie de l'Olympe: <http://www.galerie-olympes.com>

Galerie Fan Fan des Mûres

Galerie Grégory Chesne: <http://www.gregorychesne.com>

Galerie Henri Chartier: <http://www.henrichartier.com>

Galerie Juste à côté: <http://www.justeacote.fr>
Galerie Le Réverbère: <http://www.galerielereverbere.com>
Galerie OOBLIK: <http://www.ooblik.com>
Galerie Saint Firmin: <http://www.galerie-saintfirmin.com>
Younès & Magali: <http://younesetmagali.com>

Miscellaneous

Jardin botanique de Lyon: <http://www.jardin-botanique-lyon.com/>

Parc de la Tête d'or:

http://www.lyon.fr/vdl/sections/en/environnement/parcs_jardins/tete_or_1

Planétarium: <http://www.planetariumvv.com>

Adventure Park by Fourvière Aventures Park: <http://www.fourviere-aventures.com/>

Aquarium Grand Lyon: <http://www.aquariumlyon.fr/>

La piscine du Rhône, 8 Quai Claude Bernard 69007 Lyon, +33 (0)4 78 72 04 50

Piscine Jean Mermoz, 12 Place André Latarget 69008 Lyon, +33 (0)4 78 74 33 09

Centre Nautique Etienne Gagnaire - Piscine de Cusset, 59 avenue Marcel Cerdan 69100 Villeurbanne, +33 (0)4 72 37 72 02

For more adresses, please visit:

http://www.lyon.fr/vdl/sections/en/sports_loisirs/swimming_pools

A Shopping Guide is available at the Office du Tourisme, Place Bellecour.

Main shopping places:

- Shopping in the Presqu'île Croix Rousse: Breeding ground of designers
- Part Dieu Shopping
- Center Vieux Lyon (Old Lyon)
- Carré de Soie (Vaulx en Velin)

Lyon is a renowned cultural city. The main sights include:

- The Roman theatres on the Fourvière hill, together with a very nice Roman museum inside the hill.
- The Old Lyon with its late Gothic and Renaissance buildings, the St-John cathedral, and its narrow pedestrian streets.
- The Fourvière basilica on top of the hill, with its Disney-movie-like exterior, its rich interior decorations and its dominating view on the city.
- The “traboules”, a kind of public indoor passageway between streets in the Old Lyon and Croix-Rousse districts.
- The twelfth-century austere Romanesque St-Martin-d’Ainay basilica (north of Perrache trainstation).
- The Rhône left bank, a very nice walk ranging from the southernmost part of the city to the northern Parc de la Tête-d’Or and beyond.
- The Place des Terreaux (Hôtel de Ville metro station), on which are situated the city hall and the Palais St-Pierre which houses a large museum and a very refreshing public garden.
- The Opera building, near the Place des Terreaux.

Thanks to **Yann Ollivier** (ENS Lyon) for this information

Restaurants

During the conference we hope to keep you well fed: the famous French food.

Gourmet Lyon. In the kingdom of good taste, Lyon's cuisine reigns above all others. This centuries-old tradition is an intrinsic part of the Lyon way of life. If there is one title that can't be taken away from Lyon, it is definitely that of gastronomic capital of the world.

Since the 16th century, Lyon's cuisine has delighted many a customer in its "bouchon" bistros and in its first restaurants. These palate-pleasers will never disappoint and the traditional tastes remain intact.

Lyon's cuisine owes its virtuosity first of all to the quality of local produce. The farms of the Bresse and Charolais regions, the wild game of the Dombes, the fish from the Savoy lakes, the fruits and vegetables of the Rhone valley and the Forez region are all within easy reach and supply the essential ingredients for Lyon's famed cuisine. The local culinary specialties are plentiful and varied: pork products and "Cervelle de Canuts" soft cheese with herbs, "bugnes" beignets, fried pork fat, Lyonnais salad, "tablier de sapeur" tripes, "gras double" tripes, "petit salé" ham with lentils, "quenelles" dumplings (a mixture of butter, semolina and fish), black pudding, "andouillette" chitterling sausage, "paillasson" fried hashed potatoes, and more, if you're still hungry!

Today, many local 3-star restaurants (awarded by the Michelin Guide) carry the banner of Lyon cuisine throughout France and the world. You'll have a meal to remember, be it with the great chefs or in the humble "bouchons", these small traditional restaurants with picturesque interiors, serving local pork dish specialties, copiously washed down with bottles of Beaujolais or Côtes du Rhône wine.

Over 1000 restaurants contribute to the inviting and festive atmosphere of the city, along with the great chefs who are its ambassadors, but also thanks to such initiatives as the Food Trade Exhibition and the School of Culinary Arts and Hotel Management.

Michelin-star-chefs

- **Paul Bocuse**

Main restaurant:

L'Auberge du Pont de Collonges

40 Rue de la Plage - 69660 Collonges au Mont d'Or

Tel.: +33 (0)4 72 42 90 90:

<http://www.bocuse.fr/>

Brasseries:

"Le Nord" 18 Rue Neuve - 69002 Lyon (Subway line A "Hôtel de Ville")

"Le Sud" 11 Place Antonin - 69002 Lyon (Subway line A/D "Bellecour")

"L'Est" 14 Place Jules Ferry - 69006 Lyon (Subway line B "Brotteaux")

"L'Ouest" 1 Quai du Commerce - 69009 Lyon (Subway line D "Gare de Vaise")

"Argenson" 44 allée Pierre de Coubertin - 69007 Lyon (Subway line B "Stade de Gerland")

- **Pierre Orsi**

3 Place Kléber - 69006 Lyon Tel: +33 (0)4 78 89 57 68 <http://www.pierreorsi.com/>
(Subway line A "Masséna")

- **Philippe Gauvreau**

200, Avenue Casino 69890 La Tour de Salvagny Tel: +33 (0)4 78 87 29 91 <http://www.pavillon-rotonde.com/>

Streets/Areas with Typical Restaurants "Bouchons Lyonnais" "La Meunière" 11 rue Neuve - 69001 LYON (Subway line A "Cordeliers")

Rue Mercière (Subway line A "Cordeliers")

Quartier Saint-Jean (Subway line D "Vieux Lyon")

Rue de Marronniers (Subway line A/D "Bellecour")

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“Carnegie Hall” 253, Rue Marcel Mérieux - 69007 Lyon ; Meat speciality (Subway line B “Stade de Gerland”)

“Jols” 283 av. Jean Jaurès - 69007 Lyon ; Fish speciality (Subway line B “Stade de Gerland”)

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The Ayers Rock 2 Rue Désirée - 69001 Lyon

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St James Pub 19 Rue Saint-Jean - 69005 Lyon

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The Smoking Dog 16 Rue Lainerie - 69005 Lyon

The Johnny Walsh 56 Rue Saint Georges - 69005 Lyon

The Melting Pub 9 Rue du Doyenné - 69005 Lyon

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- Allo Taxi: +33 (0)4 78 28 23 23

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Full Program

Wednesday October 21

Opening Ceremony

09:15 AM - 09:30 AM

Opening Keynote by Marie-Christine Rousset: Datalog revisited for reasoning and answering queries on Linked Open Data

09:30 AM - 10:30 AM, room C4

Chair: Olivier Pivert

Abstract: In this presentation, we will describe a unifying framework for RDF ontologies and databases that we call *deductive RDF triplestores*. It consists in equipping RDF triplestores with Datalog inference rules. This rule language allows to capture in a uniform manner OWL constraints that are useful in practice, such as property transitivity or symmetry, but also *domain-specific* rules with practical relevance for users in many domains of interest. We will illustrate the expressivity of this framework for modeling Linked Data applications and its genericity for developing inference algorithms. In particular, we will show how it allows to model the problem of data linkage in Linked Data as a reasoning problem on possibly decentralized data. We will also explain how it makes possible to efficiently extract expressive modules from Semantic Web ontologies and databases with formal guarantees, whilst effectively controlling their succinctness. Experiments conducted on real-world datasets have demonstrated the feasibility of this approach and its usefulness in practice for data linkage, disambiguation and module extraction.

Coffee Break

10:30 AM - 10:45 AM

Session 1A: Data Mining Methods

10:45 AM - 12:15 PM, room C4

Chair: Olivier Pivert

Data Mining with Histograms – a Case Study

Jan Rauch and Milan Simunek

Histograms are introduced as interesting patterns for data mining. An application of the procedure CF-Miner mining for various types of histograms is described. Possibilities of using domain knowledge in a process of mining interesting histograms are outlined.

Discovering Variability Patterns for Change Detection in Complex Phenotype Data

Corrado Loglisci, Bachir Balech and Donato Malerba

The phenotype is the result of a genotype expression in a given environment. Genetic and eventually protein mutations and/or environmental changes may affect the biological homeostasis leading to a pathological status of a normal phenotype. Studying the alterations of the

phenotypes on a temporal basis becomes thus relevant and even determinant whether considering the biological re-assortment between the involved organisms and the cyclic nature of the pandemic outbreaks. In this paper, we present a computational solution that analyzes phenotype data in order to capture statistically evident changes emerged over time and track their repeatability. The proposed method adopts a model of analysis based on time-windows and relies on two kinds of patterns, *emerging* patterns and *variability* patterns. The first one models the changes in the phenotype detected between time-windows, while the second one models the changes in the phenotype replicated over time-windows. The application to Influenza A virus H1N1 subtype proves the usefulness of our *in silico* approach.

Computation of Approximate Reducts with Dynamically Adjusted Approximation Thresholds

Andrzej Janusz and Dominik Ślęzak

We continue our research on dynamically adjusted approximate reducts (DAAR). We modify DAAR computation algorithm to take into account dependencies between attribute values in data. We discuss a motivation for this improvement and analyze its performance impact. We also revisit a filtering technique which utilizes approximate reducts to create a ranking of attributes according to their relevance. As a case study we consider a data set from AAIA'14 Data Mining Competition.

Session 1B: Databases, Information Retrieval, Recommender Systems

10:45 AM - 12:15 PM, room C5

Chair: Emmanuel Coquery

A New Formalism for Evidential Databases

Fatma Ezzahra Bousnina, Mohamed Anis Bach Tobji, Mouna Chebbah, Ludovic Liétard and Boutheina Ben Yaghlane

This paper is about modeling and querying evidential databases. This kind of databases copes with imperfect data which are modeled via the evidence theory. Existing works on such data deal only with the compact form of the database. In this article, we propose a new formalism for modeling and querying evidential databases based on the possible worlds form. This work is a first step toward the definition of a strong representation system.

Ubiquitous City Information Platform powered by Fuzzy based DSSs to meet multi criteria customer satisfaction: a feasible implementation

Alberto Faro and Daniela Giordano

Aim of the paper is to illustrate a methodology to implement an ubiquitous city platform called Wi-City provided with centralized and mobile Decision Support Systems (DSSs) that take advantage from all the data of city interest including location, social data and data sensed by monitoring devices. The paper proposes to extend the existing Wi-City DSSs based on location intelligence with an advanced version based on multi criteria customer satisfaction expressed by the users grouped by age where the weights of the criteria are provided by the users instead of expert decision makers, and the rating of the aspects involved in the criteria depends on the evaluation expressed by all the service customers. Including such advanced DSSs in Wi-City makes the platform ready to provide information to users of intelligent cities where recommendations should depend on location and collective intelligence.

A framework supporting the analysis of process logs stored in either relational or NoSQL DBMSs

Bettina Fazzinga, Sergio Flesca, Filippo Furfaro, Elio Masciari, Luigi Pontieri and Chiara Pulice

The issue of devising efficient and effective solutions for supporting the analysis of process logs has recently received great attention from the research community, as effectively accomplishing any business process management task requires understanding the behavior of the processes. In this paper, we propose a new framework supporting the analysis of process logs, exhibiting two main features: a flexible data model (enabling an exhaustive representation of the facets of the business processes that are typically of interest for the analysis) and a graphical query language, providing a user-friendly tool for easily expressing both selection and aggregate queries over the business processes and the activities they are composed of. The framework can be easily and efficiently implemented by leveraging either “traditional” relational DBMSs or “innovative” NoSQL DBMSs, such as *Neo4J*.

Lunch Break

12:15 PM - 01:45 PM

Session 2A: Machine Learning

02:00 PM - 04:00 PM, room C4

Chair: Einoshin Suzuki

A Scalable Boosting Learner Using Adaptive Sampling

Jianhua Chen, Seth Burleigh, Neeharika Chennupati and Bharath Gudapati

Sampling is an important technique for parameter estimation and hypothesis testing widely used in statistical analysis, machine learning and knowledge discovery. Sampling is particularly useful in data mining when the training data set is huge. In this paper, we present a new sampling-based method for learning by Boosting. We show how to utilize the adaptive sampling method in [] for estimating classifier accuracy in building an efficient ensemble learning method by Boosting. We provide a preliminary theoretical analysis of the proposed sampling-based boosting method. Empirical studies with 4 datasets from UC Irvine ML database show that our method typically uses much smaller sample size (and is thus much more efficient) while maintaining competitive prediction accuracy compared with Watanabe’s sampling-based Boosting learner Madaboost.

WPI: Markov Logic Network-based Statistical Predicate Invention

Stefano Ferilli, Giuseppe Fatiguso and Floriana Esposito

Predicate Invention aims at discovering new emerging concepts in a logic theory. Since there is usually a combinatorial explosion of candidate concepts to be invented, only those that are really relevant should be selected, which cannot be done manually due to the huge number of candidates. While purely logical automatic approaches may be too rigid, statistical solutions provide more flexibility in assigning a degree of relevance to the various candidates in order to select the best ones. This paper proposes a new Statistical Relational Learning approach to Predicate Invention. It was implemented and tested on a traditional problem, yielding interesting results.

Learning Bayesian Random Cutset Forests

Nicola Di Mauro, Antonio Vergari and Teresa M.A. Basile

In the Probabilistic Graphical Model (PGM) community there is an interest around tractable models, i.e., those that can guarantee exact inference even at the price of expressiveness. Structure learning algorithms are interesting tools to automatically infer both these architectures and their parameters from data. Even if the resulting models are efficient at inference time, learning them can be very slow in practice. Here we focus on Cutset Networks (CNets), a recently introduced tractable PGM representing weighted probabilistic model trees with tree-structured

models as leaves. C-Nets have been shown to be easy to learn, and yet fairly accurate. We propose a learning algorithm that aims to improve their average test log-likelihood while preserving efficiency during learning by adopting a random forest approach. We combine more C-Nets, learned in a generative Bayesian framework, into a generative mixture model. A thorough empirical comparison on real word datasets, against the original learning algorithms extended to our ensembling approach, proves the validity of our approach.

Classifier fusion within the belief function framework using dependent combination rules

Asma Trabelsi, Zied Elouedi and Eric Lefèvre

The fusion of imperfect data within the framework of belief functions has been studied by many researchers over the past few years. Up to now, there are some proposed combination rules dealing with dependent information sources. Moreover, the choice of one rule among several alternatives is crucial but the criteria to be based on are still non clear. Thus, in this paper, we evaluate and compare some dependent combination rules for selecting the most efficient one under the framework of classifier fusion.

Session 2B: Knowledge Representation, Semantic Web

02:00 PM - 04:00 PM, room C5

Chair: Mohand-Saïd Hacid

The cube of opposition and the complete appraisal of situations by means of Sugeno integrals

Didier Dubois, Henri Prade and Agnes Rico

The cube of opposition is a logical structure that underlies many information representation settings. When applied to multiple criteria decision, it displays various possible aggregation attitudes. Situations are usually assessed by combinations of properties they satisfy, but also by combinations of properties they do not satisfy. The cube of opposition applies to qualitative evaluation when criteria are weighted as well as in the general case where any subset of criteria may be weighted for expressing synergies between them, as for Sugeno integrals. Sugeno integrals are well-known as a powerful qualitative aggregation tool which takes into account positive synergies between properties. When there are negative synergies between properties we can use the so-called desintegral associated to the Sugeno integral. The paper investigates the use of the cube of opposition and of the if-then rules extracted from these integrals and desintegrals in order to better describe acceptable situations.

Model checking based query and retrieval in OpenStreetMap

Tommaso Di Noia, Marina Mongiello and Eugenio di Sciascio

OpenStreetMap (OSM) is a crowd source geographical database that gives users a wide range of tools for searching and locating points of interest and to support the user in navigation on a map. This paper proposes to define a query language for OSM specifying user requests about the route to select between a source and a destination. To this purpose we use Uppaal model checker: the user poses her query specifying desired points of interest via temporal logic. the method model checks the negation of the desired property, whose counterexample will retrieve the desired path.

Granular Rules and Rule Frames for Compact Knowledge Representation

Antoni Ligeza

Efficient management of big Rule-Based Systems constitutes an important challenge for Knowledge Engineering. This paper presents an approach based on Granular Sets and Granular Relations. Granules of data replace numerous low-level items and allow for concise definition

of constraints over a single attribute. Granular Relations are used for specification of preconditions of rules. A single Granular Rule can replace numerous rules with atomic preconditions. By analogy to Relational Databases, a complete Granular Rule Frame consists of Rule Scheme and Rule Specification. Such approach allows for efficient and concise specification of powerful rules at the conceptual level and makes analysis of rule set easier. The detailed specifications of Granular Rules are much more concise than in the case of atomic attribute values, but still allow for incorporating all necessary details.

FIONA : A Framework for Indirect Ontology Alignment

Marouen Kachroudi, Aymen Chelbi, Hazem Souid and Sadok Ben Yahia

Ontology alignment process is seen as a key mechanism for reducing heterogeneity and linking the diverse data and ontologies arising in the Semantic Web. In such large infrastructure, it is inconceivable to assume that all ontologies dealing with a particular knowledge domain are aligned in pairs. Furthermore, the high performance of the alignment techniques is closely related to two major factors, *i.e.*, time consumption and resource machine limitations. Indeed, good quality alignments are valuable and it would be appropriate to harness. This paper introduces a new indirect ontology alignment method. The proposed method implements a strategy of indirect ontology alignment based on a smart direct alignments composition and reuse. Results obtained after extensive carried experiments are very encouraging and highlight many useful insights about the new proposed method.

Coffee Break

04:00 PM - 04:15 PM

Session 3A: Emotion Recognition, Music Information retrieval

04:15 PM - 06:15 PM, room C4

Chair: Ludovic Liétard

Emotion Detection Using Feature Extraction Tools

Jacek Grekow

This paper presents an analysis of the effect of features obtained from 3 different audio analysis tools on classifier accuracy during emotion detection. The research process included constructing training data, feature extraction, feature selection, and building classifiers. The obtained results indicated leaders among feature extraction tools used during classifier building for each emotion. An additional result of the conducted research was obtaining information on which features are useful in the detection of particular emotions.

Improving Speech-based Human Robot Interaction with Emotion Recognition

Berardina Nadja De Carolis, Stefano Ferilli and Giuseppe Palestra

Several studies report successful results on how social assistive robots can be employed as interface in the assisted living domain. In this domain, a natural way to interact with robots is to use a speech. However, humans often use particular intonation in the voice that can change the meaning of the sentence. For this reason, a social assistive robot should have the capability to recognize the intended meaning of the utterance by reasoning on the combination of linguistic and acoustic analysis of the spoken sentence to really understand the user's feedback. We developed a probabilistic model that is able to infer the intended meaning of the spoken sentence from the analysis of its linguistic content and from the output of a classifier able to recognise the valence and arousal of the speech prosody starting from dataset. The results showed that reasoning on the combination of the linguistic content with acoustic features of the spoken sentence was better than using only the linguistic component.

Tracing Shifts in Emotions in Streaming Social Network Data

Troels Andreassen, Henning Christiansen and Christian Theil Have

Shifts in emotions towards given topics on social media are often related to momentous real world events, and for the researcher or journalist, such changes may be the first observable sign that something interesting is going on. Further research on why a topic t suddenly has become, say, more or less popular, may involve searching for topics t' whose co-occurrence with t have increased significantly together with the change in emotion. We hypothesize that t' and its increasing relationship to t may relate to a contributing cause why the attitude towards t is changing. A method and tool is presented that monitors a stream of messages, reporting topics with changing emotions and indicating explanations by means of related topics whose increasing occurrence are taken as possible clues of why the change did happen.

Machine Intelligence: The Neuroscience of Chordal Semantics & its Association with Emotion Constructs and Social Demographics.

Rory Lewis, Chad Mello and Michael Bihn

We present an extension to knowledge discovery in Music Information Retrieval (MIR) databases and the emotional indices associated with i) various scalar theory, and ii) correlative behavioral demographics. Certain societal demographics are set in their ways as to how they dress, behave in society, solve problems and deal with anger and other emotional states. It is also well documented that particular musical scales evoke particular states of emotion and personalities of their own. This paper extends the work that Knowledge Discovery in Databases (KDD) and Rough Set Theory has opened in terms of mathematically linking music scalar theory to emotions. We now, extend the paradigm by associating emotions, based from music, to societal demographics and how strong these relationships to music are as to affect, if at all, how one may dress, behave in society, solve problems and deal with anger and other emotional states.

Session 3B: Network Analysis, Multi-Agent Systems

04:15 PM - 06:15 PM, room C5

Chair: Peter A. Eklund

Communities identification using nodes features

Sara Ahajjam, Hassan Badir, Rachida Fissoune and Mohamed El Haddad

The network sciences have provided significant strides for understanding complex systems. Those systems are represented by graphs. One of the most relevant features of graphs representing real systems is clustering, or community structure. The communities are clusters (groups) of nodes, with more edges connecting to nodes of the same cluster and comparatively fewer edges connecting to nodes of different clusters. It can be considered as independent compartments of a graph. There are two possible sources of information we can use for the community detection: the network structure, and the attributes and features of nodes. In this paper, we use the features of nodes to detect communities. There are nodes in network that are more able and susceptible to diffuse information and propagate influence. The main purpose of our approach is to find leader nodes of networks and to form community around those nodes. Unlike to most existing researches studies, the proposed algorithm doesn't require a priori knowledge of k number of communities to be detected

Abstract and Local Rule Learning in Attributed Networks

Henry Soldano, Guillaume Santini and Dominique Bouthinon

We address the problem of finding local patterns and related local knowledge, represented as implication rules, in an attributed graph. Our approach consists in extending frequent closed

pattern mining to the case in which the set of objects is the set of vertices of a graph, typically representing a social network. We recall the definition of *abstract closed patterns*, obtained by restricting the support set of an attribute pattern to vertices satisfying some connectivity constraint, and propose a *specificity measure* of abstract closed patterns together with an *informativity measure* of the associated *abstract implication rules*. We define in the same way *local closed patterns*, i.e. maximal attribute patterns each associated to a connected component of the subgraph induced by the support set of some pattern, and also define *specificity* of local closed patterns together with *informativity* of associated *local implication rules*. We also show how, by considering a derived graph, we may apply the same ideas to the discovery of local patterns and local implication rules in non disjoint parts of a subgraph as k -cliques communities.

An Intelligent Agent Architecture for Smart Environments

Stefano Ferilli, Berardina Nadjia De Carolis and Domenico Redavid

This paper proposes an architecture for agents that are in charge of handling a given environment in an Ambient Intelligence context, ensuring suitable contextualized and personalized support to the user's actions, adaptivity to the user's peculiarities and to changes over time, and automated management of the environment itself. Functionality involves multi-strategy reasoning and learning, workflow management and service composition. In Multi-Agent Systems, different types of agents may implement different parts of this architecture.

Trust Metrics Exploration in Optimizing Stock Investment Strategies

Zheyuan Su and Mirsad Hadzikadic

The decision-making process in stock investment requires not only the rational trading rules practices, but also faith that market information is reliable. A trust metric is an indication of the degree to which one social actor trusts another. In our Agent-Based Model we built a stock-trading model that issues a daily stock trading signal. This paper introduces an agent-based model for finding the optimal degree of trust in stock transactions. The system has been evaluated in the context of Bank of America stock in the period of 1987–2014. The model outperformed both S&P 500 and buy-and-hold Bank of America stock strategy by two to three times.

Thursday October 22

Morning Keynote by Didier Dubois: The Basic Principles of Information Fusion and their Instantiations in Various Uncertainty Representation Frameworks

09:00 AM - 10:00 AM, room C4

Chair: Zbigniew W. Ras

Abstract: Information fusion is a specific aggregation process which aims to extract truthful knowledge out of information coming from various sources. This topic is relevant in many areas: expert opinion fusion in risk analysis, image fusion in computer vision, sensor fusion in robotics, database merging, and so forth. Historically the problem is very old. It lies at the origin of probability theory whose pioneers in the XVIIth century were concerned by merging unreliable testimonies at courts of law. Then, this problem fell into oblivion with the development of statistics in the late XVIIIth century. It was revived in the late XXth century in connection with the widespread use of computers, and the necessity of dealing with large amounts of data coming from different sources, as well as the renewed interest toward processing human-originated information, and the construction of autonomous artifacts that sense their environment and reason with uncertain and inconsistent inputs.

Information fusion is inescapably related to the issue of uncertainty modeling. Indeed, the fact that pieces of information often come from several sources results in conflicts to be solved, as inconsistency threatens in such an environment. The presence of incomplete, unreliable and inconsistent information leads to uncertainty, and the necessity of coping with it, so as make the best of what is available, while discarding the wrong. This is the role of information fusion.

There are many approaches and formats to model information, and several uncertainty theories. The information fusion problem has been discussed in each of these settings almost independently of the other ones. Sometimes, dedicated principles have been stated in order to characterize the specific features of the fusion process in the language of each particular formal setting. Several fusion strategies exist according to the various settings. These strategies share some commonalities but may differ from each other in some aspects due to their specific representation formats (for instance, symbolic vs. numerical).

This work takes an inclusive view of the current available properties from different theories and investigates the common laws that *must be* followed by these fusion strategies. We argue that some properties are mandatory and some are facultative only. The latter can be useful in certain circumstances, or to speed up computation time. It is interesting to notice that although each requested property looks intuitively reasonable on its own, they can be inconsistent when put together. This happens in the problem of merging preferences from several individuals modelled by complete preorderings (Arrow impossibility theorem). However the core mandatory properties of information fusion we propose are often globally consistent. We present general features of what can be called an information item. Such features can be extracted from information items in each representation framework.

The aim of the work is to lay bare the specific nature of the information fusion problem. This general analysis yields a better understanding of what fusion is about and how an optimal fusion strategy (operator) can be designed. In particular, information fusion differs from preference aggregation, whose aim is to find a good compromise between several parties. Noticeably, while the result of information fusion should be consistent with what reliable sources bring about, a good compromise in a multiagent choice problem may turn out to be some proposal no party proposed in the first stand. So while they share some properties and methods, we claim that information fusion and preference aggregation do not obey exactly the same principles.

We also wish to show the deep unity of information fusion methods, beyond the particulars of each representation setting. To this aim, we look at special characteristics of each theory and what becomes of fusion principles, what are the fusion rules in agreement with these principles.

We check whether known fusion rules in each theory comply with general postulates of information fusion. We explain how these basic properties can be written in different representation settings ranging from numerical to logic-based representations. These comparisons demonstrate that the proposed core properties truly reflect the nature of fusion in different settings.

We instantiate our principles on various representation settings such as

- The crudest representation of an information item, namely a set of possible values. When such a set basically excludes impossible values, we show that our setting characterizes the method of maximal consistent subsets [5].
- The case of merging propositional belief bases, for which a set of postulates, due to Konieczny and Pino-Perez, exists [4]. It comes down to merging sets of most plausible values.
- the fusion of plausibility rankings of possible values, going from ordinal representations to numerical ones in terms of fuzzy sets representing possibility distributions [3].
- Combination rules for belief functions [6], especially Dempster rule of combination.
- Postulates for merging imprecise probabilities proposed by Peter Walley [7], in the light of our general approach.

Preliminary and partial views of this work were presented in two conferences [1,2]. A long paper is in preparation.

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Coffee Break

10:00 AM - 10:15 AM

Session 4A: Machine Learning

10:15 AM - 12:15 PM, room C4

Chair: Akm Rafiqul Haque

On the Effectiveness of Evidence-based Terminological Decision Trees

Giuseppe Rizzo, Claudia D'Amato and Nicola Fanizzi

Concept learning methods for Web ontologies inspired by *Inductive Logic Programming* and the derived inductive models for class-membership prediction have been shown to offer viable solutions to concept approximation, query answering and ontology completion problems. They generally produce human-comprehensible logic-based models (e.g. terminological decision trees) that can be checked by domain experts. However, one difficulty with these models is their inability to provide a way to measure the degree of uncertainty of the predictions. A framework for inducing terminological decision trees extended with evidential reasoning has been proposed to cope with these problems, but it was observed that the prediction procedure for these models tends to favor cautious predictions. To overcome this limitation, we further improved the algorithms for inducing/predicting with such models. The empirical evaluation shows promising results also in comparison with major related methods.

Clustering Classifiers Learnt from Local Datasets Based on Cosine Similarity

Kaikai Zhao and Einoshin Suzuki

In this paper we present a new method to measure the degree of dissimilarity of a pair of linear classifiers. This method is based on the cosine similarity between the normal vectors of the hyperplanes of the linear classifiers. A significant advantage of this method is that it has a good interpretation and requires very little information to exchange among datasets. Evaluations on a synthetic dataset, a dataset from the UCI Machine Learning Repository, and facial expression datasets show that our method outperforms previous methods in terms of the normalized mutual information.

HC-edit: A Hierarchical Clustering Approach To Data Editing

Paul Amalaman and Christoph F. Eick

Many nearest neighbor based classification approaches require that atypical and mislabeled examples be removed from the training dataset in order to achieve high accuracy. Current editing approaches often remove excessive amount of examples from the training set which does not always lead to optimum accuracy rate. We introduce a new editing method, called HC-edit,—for the k-nearest neighbor classifier—that recognizes areas in the dataset of high purities and removes minority class examples from those regions. The proposed method takes hierarchical clusters with purity information as its input. To edit the data, clusters with purities above a user-defined purity threshold are selected and minority class examples are removed from the selected clusters. Experiments carried out on real datasets using trees generated by traditional agglomerative hierarchical approaches, and trees generated by a supervised taxonomy method which incorporates class label information in the clustering process show that the new approach leads to improved accuracy and does well in comparison to other editing methods.

Ontology-based Topic Labeling and Quality Prediction

Heidar Davoudi and Aijun An

Probabilistic topic models based on Latent Dirichlet Allocation (LDA) are increasingly used to discover hidden structure behind big text corpora. Although topic models are extremely useful tools for exploring and summarizing large text collections, most of time the inferred topics are not easy to understand and interpret by human. In addition, some inferred topics may be described by words that are not much relevant to each other and are thus considered low quality topics. In this paper, we propose a novel method that not only assigns a label to each topic but also identifies low quality topics by providing a reliability score for the label of each topic. Our rationale is that a topic labeling method cannot provide a good label for a low quality topic, and thus predicting label reliability is as important as topic labeling itself. We propose a novel measure (Ontology-Based Coherence) that can assess coherence of topics

with respect to an ontology structure effectively. Empirical results on a real dataset and our user study show that the proposed predictive model using the defined measures can predict the label reliability better than two alternative methods.

Session 4B: Databases, Information Retrieval, Recommender Systems

10:15 AM - 12:45 PM, room C5

Chair: Andrzej Janusz

An Approximate Proximity Graph Incremental Construction for Large Image Collections Indexing

Frédéric Rayar, Sabine Barrat, Fatma Bouali and Gilles Venturini

This paper addresses the problem of the incremental construction of an indexing structure, namely a proximity graph, for large image collections. To this purpose, a local update strategy is examined. Considering an existing graph G and a new node q , how only a relevant sub-graph of G can be updated following the insertion of q ? For a given proximity graph, we study the most recent algorithm of the literature and highlight its limitations. Then, a method that leverages an edge-based neighbourhood local update strategy to yield an approximate graph is proposed. Using real-world and synthetic data, the proposed algorithm is tested to assess the accuracy of the approximate graphs. The scalability is verified with large image collections, up to one million images.

Experimenting analogical reasoning in recommendation

Nicolas Hug, Henri Prade and Gilles Richard

Recommender systems aim at providing suggestions of interest for end-users. Two main types of approach underlie existing recommender systems: content-based methods and collaborative filtering. In this paper, encouraged by good results obtained in classification by analogical proportion-based techniques, we investigate the possibility of using analogy as the main underlying principle for implementing a prediction algorithm of the collaborative filtering type. The quality of a recommender system can be estimated along diverse dimensions. The accuracy to predict user's rating for unseen items is clearly an important matter. Still other dimensions like *coverage* and *surprise* are also of great interest. In this paper, we describe our implementation and we compare the proposed approach with well-known recommender systems.

Personalized Meta-Action Mining for NPS Improvement

Jieyan Kuang, Zbigniew Ras and Albert Daniel

The paper presents one of the main modules of HAMIS recommender system built for 34 business companies (clients) involved in heavy equipment repair in the US and Canada. This module is responsible for meta-actions discovery from a large collection of comments, written as text, collected from customers about their satisfaction with services provided by each client. Meta-actions, when executed, trigger action rules discovered from customers data which are in a table format. We specifically focus on the process of mining meta-actions, which consists of four representative and characteristic steps involving sentiment analysis and text summarization. Arranging these four steps in proposed order distinguishes our work from others and better serves our purpose. Compared to procedures presented in other works, each step in our procedure is adapted accordingly with respect to our own observations and knowledge of the domain. Results obtained from the experiments prove the high effectiveness of the proposed approach for mining meta-actions.

On the Qualitative Calibration of Bipolar Queries

Jalel Akaichi, Ludovic Lietard, Daniel Rocacher and Olfa Slama

This article considers the bipolar approach to define database queries expressing users' preferences (flexible queries). An algebraic framework for the definition of flexible queries of relational databases using fuzzy bipolar conditions of type and-if-possible and or-else has been considered. This paper defines some qualitative calibrations of such queries to specify a minimal quality of answers and to reduce their number. Different operators (extended α -cuts) are defined and studied in this article. They can apply on the set of answers to express a qualitative calibrations of bipolar fuzzy queries. Some properties of these extended α -cuts are pointed out and some of their applications for query evaluation are shown.

Multi-Dimensional Reputation Modeling using Micro Blog contents

Jean-Valère Cossu, Eric Sanjuan, Juan-Manuel Torres-Moreno and Marc El-Beze

In this paper, we investigate the issue of modeling corporate entities' online reputation. We introduce a bayesian latent probabilistic model approach for e-Reputation analysis based on Dimensions (Reputational Concepts) Categorization and Opinion Mining from textual content. Dimensions to analyze e-Reputation are set up by analyst as latent variables. Machine Learning (ML) Natural Language Processing (NLP) approaches are used to label large sets of text passages. For each Dimension, several estimations of the relationship with each text passage are computed as well as Opinion and Priority. The proposed automatic path modeling algorithm explains Opinion or Priority scores based on selected Dimensions. Model Robustness' is evaluated over RepLab dataset.

Lunch Break

12:45 PM - 02:00 PM

Session 5A: Applications

02:00 PM - 03:30 PM, room C4

Chair: Alicja Wieczorkowska

Audio-Based Hierarchic Vehicle Classification for Intelligent Transportation Systems

Elzbieta Kubera, Alicja Wieczorkowska and Krzysztof Skrzypiec

Nowadays almost everybody spends a lot of time commuting and traveling, so we are all very much interested in smooth use of various roads. Also governing bodies are concerned to assure efficient exploitation of the transportation system. The European Union announced a directive on Intelligent Transport Systems in 2010, to ensure that systems integrating information technology with transport engineering are deployed within the Union. In this paper we address automatic classification of vehicle type, based on audio signals only. Hierarchical classification of vehicles is applied, using decision trees, random forests, artificial neural networks, and support vector machines. A dedicated feature set is proposed, based on spectral ranges best separating the target classes. We show that longer analyzing frames yield better results, and a set of binary classifiers performs better than a single multi-class classifier.

A Novel Information Fusion Approach for Supporting Shadow Detection in Dynamic Indoor and Outdoor Environments

Alfredo Cuzzocrea, Enzo Mumolo, Alessandro Moro and Kazunori Umeda

In this paper we present a system for detecting shadows in dynamic indoor and outdoor environment. The algorithm we propose fuses together color and stereo disparity information. Some considerations on the nature of the shadow improves the algorithm's ability to candidate

the pixels as shadow or foreground. The candidate of both color and disparity information are then weighted by analyzing the effectiveness in the scene. The techniques employed allows separate computation and multithreading operations.

Extending SKOS: A Wikipedia-based unified annotation model for creating interoperable domain ontologies

Elshaimaa Ali and Vijay Raghavan

Interoperability of annotations in different domains is an essential demand to facilitate the interchange of data between semantic applications. Foundational ontologies, such as SKOS (Simple Knowledge Organization System), play an important role in creating an interoperable layer for annotation. We are proposing a multi-layer ontology schema, named SKOS-Wiki, which extends SKOS to create an annotation model and relies on the semantic structure of the Wikipedia. We also inherit the DBpedia definition of named entities. The main goal of our proposed extension is to fill the semantic gaps between these models to create a unified annotation schema.

Session 5B: Knowledge representation, semantic Web

02:00 PM - 03:30 PM, room C5

Chair: Didier Dubois

Safe Suggestions Based on Type Convertibility to Guide Workflow Composition

Mouhamadou Ba, Sebastien Ferre and Mireille Ducasse

This paper proposes an interactive approach that guides users in the step-by-step composition of services by providing safe suggestions based on type convertibility. Users specify the points of the workflow (called the focus) they want to complete, and our approach suggests services and connections whose data types are compatible with the focus. We prove the safeness (every step produces a well-formed workflow) and the completeness (every well-formed workflow can be built) of our approach.

MUSETS: Diversity-aware Web Query Suggestions for Shortening User Sessions

Marcin Sydow, Cristina Muntean, Franco Nardini, Stan Matwin and Fabrizio Silvestri

We propose MUSETS (multi-session total shortening) – a novel formulation of the query suggestion task, specified as an optimization problem. Given an ambiguous user query, the goal is to propose the user a set of query suggestions that optimizes a diversity-aware objective function. The function models the expected number of query reformulations that a user would save until reaching a satisfactory query formulation. The function is diversity-aware, as it naturally enforces high coverage of different alternative continuations of the user session. For modeling the topics covered by the queries, we also use an extended query representation based on entities extracted from Wikipedia. We apply a machine learning approach to learn the model on a set of user sessions to be subsequently used for queries that are under-represented in historical query logs and present an evaluation of the approach.

Encoding a preferential extension of the description logic SROIQ into SROIQ

Laura Giordano and Valentina Gliozzi

In this paper we define an extension of the description logic *sROIQ* based on a preferential semantics to introduce a notion of typicality in the language which allows defeasible inclusions to be represented in a knowledge base. We define a polynomial encoding of the resulting language into *sROIQ*, thus showing that reasoning in the preferential extension of *sROIQ* has the same complexity as reasoning in *sROIQ*.

Coffee Break

03:30 PM - 03:45 PM

Session 6A: Machine learning, semantic Web

03:45 PM - 05:15 PM, room C4

Chair: *Christophe Rey*

Tweets as a Vote: Exploring Political Sentiments on Twitter for Opinion Mining

Muhammed Olorunnimbe and Herna Viktor

Twitter feeds provide data scientists with a large repository for entity based sentiment analysis. Specifically, the tweets of individual users may be used in order to track the ebb and flow of their sentiments and opinions. However, this domain poses a challenge for traditional classifiers, since the vast majority of tweets are unlabeled. Further, tweets arrive at high speeds and in very large volumes. They are also suspect to change over time (so-called concept drift). In this paper, we present the PyStream algorithm that addresses these issues. Our method starts with a small annotated training set and bootstraps the learning process. We employ online analytic processing (OLAP) to aggregate the opinions of the individuals we track, expressed in terms of the votes they would cast in a national election. Our results indicate that we are able to capture the sentiments of individuals as they evolve over time.

Sentiment Dictionary Refinement Using Word Embeddings

Aleksander Wawer

Previous works on Polish sentiment dictionaries revealed the superiority of machine learning on vectors created from word contexts (concordances or word co-occurrence distributions), especially compared to the SO-PMI method (semantic orientation of pointwise mutual information). This paper demonstrates that this state-of-the-art method could be improved upon when extending the vectors by word embeddings, obtained from skip-gram language models. Specifically, it proposes a new method of computing word sentiment polarity using feature sets composed of vectors created from word embeddings and word co-occurrence distributions. The new technique is evaluated in a number of experimental settings.

iQbees: Towards Interactive Semantic Entity Search Based on Maximal Aspects

Grzegorz Sobczak, Mateusz Chochól, Ralf Schenkel and Marcin Sydow

Similar entity search by example is an important task in the area of retrieving information from semantic knowledge bases. In this paper we define a new interactive variant of this problem that is called iQbees for “Interactive Query-by-Example Entity Search” and is an extension of a previous QBEEES approach. We also present a working on-line prototype demo which implements the proposed approach.

Session 6B: Planing, classification

03:45 PM - 05:15 PM, room C5

Chair: *Laura Giordano*

Planning with Sets

Rajdeep Niyogi and Alfredo Milani

In some real world applications like robotics, manufacturing, the same planning operator with single or multiple effects is instantiated to several objects. This is quite different from performing the same action (or plan) several times. In this paper we give an approach to

construct an iterated form of these operators (actions). We call such actions iterated actions that are performed on sets of objects. In order to give a compact and formal specification of such actions, we define a new type of predicate called set predicate. We show that iterated actions on sets behave like classical planning actions. Thus any classical planner can be used to synthesize plans containing iterated actions. We formally prove the correctness of this approach. An implementable description of iterated actions is given in PDDL for an example domain. The implementations were carried out using the state-of-the-art BlackBox planner.

Qualitative planning of object pushing by a robot

Domen Šoberl, Jure Žabkar and Ivan Bratko

Pushing is often used by robots as a simple way to manipulate the environment and has in the past been well studied from kinematic and numerical perspective. The paper proposes a qualitative approach to pushing convex polygonal objects by a simple wheeled robot through a single point contact. We show that by using qualitative reasoning, pushing dynamics can be described in concise and intuitive manner, that is still sufficient to control the robot to successfully manipulate objects. Using the QUIN program on numerical data collected by our robot while experimentally pushing objects of various shapes, we induce a model of pushing. This model is then used by our planning algorithm to push objects of previously unused shapes to given goal configurations. The produced trajectories are compared to smooth geometric solutions. Results show the correctness of our qualitative model of pushing and efficiency of the planning algorithm.

Musical Instrument Separation Applied to Music Genre Classification

Aldona Rosner and Bozena Kostek

This paper outlines first issues related to music genre classification and a short description of algorithms used for musical instrument separation. Also, the paper presents proposed optimization of the feature vectors used for music genre recognition. Then, the ability of decision algorithms to properly recognize music genres is discussed based on two databases. In addition, results are cited for another database with regard to the efficiency of the feature vector.

Gala Dinner

07:30 PM - 12:30 AM

Friday October 23

Morning Keynote by Thomas Lukasiewicz: Uncertainty in the Semantic Web

09:15 AM - 10:15 AM, room C4

Chair: Mohand-Saïd Hacıd

Abstract: Significant research activities have recently been directed towards the Semantic Web as a potential future substitute of the current World Wide Web. Many experts predict that the next huge step forward in Web information technology will be achieved by adding semantics to Web data. An important role in research towards the Semantic Web is played by formalisms and technologies for handling uncertainty and/or vagueness. In the invited talk, I first provide some motivating examples for handling uncertainty and/or vagueness in the Semantic Web. I then give an overview of some own recent formalisms for handling uncertainty and/or vagueness in the Semantic Web.

Coffee Break

10:15 AM - 10:30 AM

Session 7A: Textual Data Analysis and Mining

10:30 AM - 12:00 PM, room C4

Chair: Mirsad Hadzikadić

Harvesting comparable corpora and mining them for equivalent bilingual sentences using statistical classification and analogy-based heuristics

Krzysztof Wotk, Emilia Rejmund and Krzysztof Marasek

Parallel sentences are a relatively scarce but extremely useful resource for many applications including cross-lingual retrieval and statistical machine translation. This research explores our new methodologies for mining such data from previously obtained comparable corpora. The task is highly practical since non-parallel multilingual data exist in far greater quantities than parallel corpora, but parallel sentences are a much more useful resource. Here we propose a web crawling method for building subject-aligned comparable corpora from e.g. Wikipedia dumps and Euronews web page. The improvements in machine translation are shown on Polish-English language pair for various text domains. We also tested another method of building parallel corpora based on comparable corpora data. It lets automatically broad existing corpus of sentences from subject of corpora based on analogies between them.

Discovering Type of Spatial Relations with a Text Mining Approach

Sarah Zenasni, Eric Kergosien, Mathieu Roche and Maguelonne Teisseire

Knowledge discovery from texts, particularly the identification of spatial information is a difficult task due to the complexity of texts written in natural language. Here we propose a method combining two statistical approaches (lexical and contextual analysis) and a text mining approach to automatically identify types of spatial relations. Experiments conducted on an English corpus are presented.

Author Disambiguation

Aleksandra Campar, Burcu Kolbay, Hector Aguilera, Iva Stankovic, Kaiser Co, Fabien Rico and Djamel Abdelkader Zighed

This paper proposes a novel approach in incorporating several metadata such as citations, co-authorship, titles, and keywords to identify real authors in author disambiguation task.

Classification schemes make use of these variables to identify authorship. The methodology performed in this paper is: 1) coarse grouping of article by the use of focus names, 2) Applying a model using paper metadata to identify same authorship, and 3) separate the true authors having the same focus name.

Lunch Break

12:00 PM - 01:30 PM

Session 7B: Applications

01:30 PM - 03:00 PM, room C4

Chair: Stefano Ferilli

Toward real-time multi-criteria decision making for bus service reliability optimization

Vu Tran, Peter Eklund and Chris Cook

This paper addresses issues associated with the real-time control of public transit operations to minimize passenger wait time: namely vehicle headway, maintenance of passenger comfort, and reducing the impact of control strategies. The randomness of passenger arrivals at bus stops and external factors (such as traffic congestion and bad weather) in high frequency transit operations often cause irregular headway that can result in decreased service reliability. The approach proposed in this paper, which has the capability of handling the uncertainty of transit operations based on Multi-objective evolutionary algorithm using a dynamic Bayesian network, applies preventive strategies to forestall bus unreliability and, where unreliability is evident, restore reliability using corrective strategies. “Holding”, “expressing”, “short-turning” and “deadheading” are the corrective strategies considered in this paper.

Building Thermal Renovation Overview Combinatorics + Constraints + Support System

Andrés Felipe Barco Santa, Elise Vareilles, Michel Aldanondo and Paul Gaborit

Facade-layout synthesis is a combinatorial problem that arises when insulating buildings with rectangular parameterizable panels. At the core of the problem lies the assignment of size to an unknown number of panels and their arrangement over a rectangular facade surface. The purpose of this communication is to give an overview of the facade-layout synthesis problem and its reasoning by constraint satisfaction problems. Then, we show the combinatorial characteristics of the problem, its modeling by means of constraint satisfaction and a decision support system that solves the problem using several constraint-based algorithms.

Frequency based mapping of the STN borders

Konrad Ciecierski, Zbigniew Ras and Andrzej Przybyszewski

During deep brain stimulation (DBS) surgery for Parkinson disease, the target is the subthalamic nucleus (STN). STN is small, (9 x 7 x 4 mm) and typically localized by a series of parallel microelectrodes. As those electrodes are in steps advanced towards and through the STN, they record the neurobiological activity of the surrounding tissues. By careful inspection and analysis of such recordings one can obtain a range of depth at which given electrodes passed through the STN. Both human made inspection and computer based analysis are performed during surgery in the environment of the operation theatre. There are several methods for the STN detection, one of them – developed by the authors – is described in . While the detection of the STN interior can be obtained with good certainty its borders can be slightly fuzzy and sometimes it is difficult to classify whether given depth should be regarded as belonging to the STN proper or lying outside of it. Mapping of the borders is important as the tip of the final permanent stimulating electrode is often placed near the ventral border of the STN . In

this paper we are showing that analysis focusing on narrow frequency bands can yield better discrimination of the *STN* borders and *STN* itself.

Closing Session

03:00 PM - 03:15 PM

